

Main Haulage Scaling Exercise
Problem Booklet

Mining Systems and Human Engineering
U. S. Bureau of Mines
Pittsburgh, Pennsylvania

Instructions

Read the background and problem situation described on the next page. Then answer each of the fourteen questions. Some questions will ask you to look at a slide. Look at the appropriate slide, then continue on with the question. Don't jump ahead, but look only at the question and slide to which you are directed. However, you may look back to earlier questions, answers, or slides at any time. Some questions ask you to select as MANY answers as you think are correct. Other questions ask you to select only ONE answer unless you are told to try again. Follow the directions for each question.

After you have made your choice for a question, look up its number on the answer sheet. Select your answer(s) to each question by rubbing the special pen between the brackets on the answer sheet. Be sure to fill in the entire bracket space because it may contain important information to help you complete the exercise. A hidden message will appear and tell you if you are right. When you have finished all of the questions, you will learn how to score your performance.

Background

You are a swing shift locomotive operator at the Shannon Kelly Mine No. 3.

You have nine years of underground mining experience and have been running a locomotive for 7 years.

Lynnbo is a shop mechanic substituting for an absent motorman. He has 4 years of underground experience, all as a mechanic.

Roof conditions are generally good, with occasional slips and clay veins.

The Shannon Kelly Mine No. 3 has an 80 inch coal seam.

Power for the locomotives is provided by a 550 volt trolley wire.

The mine uses 37 ton locomotives equipped with compressor air braking systems and portable non-conductive trolley guards.

Problem

You are running the lead locomotive pulling twenty empty coal cars into 3 East. Lynnbo is running the trail locomotive behind the trip. When you are done putting the empties on the section tibble, Lynnbo asks if you noticed the area of bad roof outby the firecar on the main line. You answer that you hadn't, and you ask Lynnbo how bad it looked. Lynnbo said he thought the roof looked ugly to him, but since he works in the shop, it all looks ugly. This is your section and you know it has been rebolted recently. However, you decide to look at it. You tell Lynnbo that you will follow him to the area in question. Turn the page and answer Question A.

Question A

Arriving at the area of suspected bad roof, you stop both motors inby the area in question. This is what you and Lynnbo see (Look at Slide 1). Even though the roof has been rebolted, there are some indications that this could be an area of bad top. What do you see to confirm this? (Select as MANY as you think are correct.)

1. Absence of rock dust on the roof.
2. A loose, hanging roof bolt.
3. Rusty bolt plates.
4. Loose coal and rock between the tracks.
5. Roof rock fallen away from a bolt (sometimes called a "chandelier").

When you have made your selection(s) do the next question.

Question B

Because this section of questionable roof is on the main line, you decide to make a more detailed examination of the area to get a better idea of the extent of the problem. You look at the area more closely and from a slightly different angle and direction. (Look at Slide 2.) What potentially hazardous conditions can you see now? (Select as MANY as you think are correct.)

6. A crumbling clay vein.
7. An insufficient number of bolts through the clay vein.
8. Expansion-shell bolts used in place of resin bolts.
9. Lack of header boards along the lip of the clay vein.

When you have made your selection(s) do the next question.

Question C

After examining the roof area further, you see that there is a gap in the roof. (Look at Slide 3.) This slide shows a close up of one small area (taken with a zoom lens). What should you and Lynnbo do first? (Choose only ONE unless you are told to "Try Again!")

10. Tighten any loose roof bolts.
11. Set posts across the track.
12. Call outside for roofbolters.
13. Take down loose top.

Question D

You and Lynnbo agree that some of the loose roof should be taken down. What should you do before you start scaling? (Select as MANY as you think are correct.)

14. Call the shift foreman to brief him about the situation.
15. Even though you don't normally carry all barring tools on the locomotive, check to see what you have.
16. Run one locomotive outby to block the access to the bad roof area.
17. Call the dispatcher and advise him of the problem.
18. Nothing. You are not roof control specialists.
19. Begin prying the top with the tools on hand.
20. Send Lynnbo on your inby locomotive to the 3 East section tipple to find slate bars, shovels, etc. while you stay with the other locomotive.

When you have made your selection(s) do the next question.

Question E

When you talked to the foreman, he told you to proceed with barring the roof, but he wants to be kept informed of the situation. Lynnbo then takes your locomotive and heads for the tipple. He returns with a shovel, slate bars and a sledge hammer. What should be done before you begin to bar the roof? (Select as MANY as you think are correct.)

21. Observe and "listen" to the area from a safe distance.
22. Sound the roof that surrounds the bad top.
23. Devise a plan for working on this problem safely.
24. Remove any stumbling hazards from your work area.
25. Guard the trolley wire next to the work area.
26. Using the compressors from your locomotives, blow the dust off the track and the surrounding area.
27. Call the 3 East tipple operator and tell him that there won't be any more empties today.

When you have made your selection(s) do the next question.

Question F

You and Lynnbo are now ready to begin barring. Lynnbo grabs the shovel and begins to pry the roof. You stop Lynnbo and tell him to use a slate bar instead of the shovel. What other safe barring practices should you tell Lynnbo to use? (Select as MANY as you think are correct.)

- 28. Check to make sure the bar is long enough and is straight.
- 29. Cordon off the work area with reflective tape.
- 30. Bounce on the bar as you need to exert more force.
- 31. Wear safety glasses and gloves.
- 32. Jab at the roof with the pointed end of the bar to knock down pieces of roof material.
- 33. Continue scaling without stopping, until the roof is safe.
- 34. Take occasional breaks.
- 35. Stand on solid bottom while you scale, not on loose rubble or wooden cribs.
- 36. Rockdust any newly exposed roof.

When you have made your selection(s) do the next question.

Question G

You and Lynnbo continue to scale the roof. You notice a large piece of rock hanging above the trolley wire. You must pull it down, but working around an energized cable is dangerous and the falling rock could damage the trolley wire. You know there is a trolley wire disconnect switch about six hundred feet outby. What should you do about this situation before you scale down the loose rock? (Choose only ONE unless you are told to "Try Again!")

- 37. De-energize the trolley wire.
- 38. Nothing. Start to bar down the rock as soon as possible.
- 39. Inform the dispatcher that you are going to de-energize the trolley wire.

Question H

The dispatcher gave you the OK to de-energize the trolley line. You called the foreman to tell him of your plans. He tells you to go ahead and reminds you that there are no segregation switches inby you. What should you do now? (Select as MANY as you think are correct.)

- 40. Cut the trolley wire.
- 41. Block the wheels of the locomotive and apply the mechanical brakes.
- 42. Leave the locomotive trolley poles on the wire, the lights switched to the "on" position. The lights of the locomotive will go off as a test that the trolley line is de-energized.
- 43. Ask Lynnbo to walk outby to the trolley switch, knock out the blade of the switch and return.

When you have made your selection(s) do the next question.

Question I

After having de-energized and dangered off the trolley switch, you and Lynnbo successfully scaled down the rock above the trolley wire. You are satisfied that all of the loose roof above the trolley wire is down. What should you do before turning on the power? (Select as MANY as you think are correct.)

- 44. Nothing. Turn on the power now and then proceed to the tibble with Lynnbo.
- 45. Have the dispatcher inquire whether it is safe to energize the trolley wire.
- 46. Call the foreman and ask him to turn the power on when he comes in.
- 47. Examine the roof to be sure it is still in compliance with the original approved roof control plan for this area of the mine.

When you have made your selection(s) do the next question.

Question J

The power is now on and you have returned to work at your usual duties. Later, the foreman thanks you and Lynnbo for your concern over an important safety issue. Miners should take some action when they observe any potentially dangerous conditions. What are some common reasons why some workers do not take similar action when they see roof conditions like these? (Select as MANY as you think are correct.)

- 48. The mine examiner has examined the area for hazards and they think his initials certify that he has found the area to be safe.
- 49. They feel it is not their responsibility. The foreman should tell them what to do.
- 50. They feel the hazardous condition may be something they could work around and doesn't affect them.
- 51. They believe government inspectors and management officials are the only ones responsible for the safety of the mine.
- 52. They believe the hazardous condition isn't too severe.

When you have made your selection(s) do the next question.

Question K

It is important to use safe barring practices at all times and to concentrate on the task at hand. (Look at Slide 4.) What unsafe barring practices are being used by this miner ? (Select as MANY as you think are correct.)

- 53. He is standing too close to the area being barred.
- 54. He is standing on floor rubble.
- 55. He didn't guard the trolley wire before starting.

When you have made your selection(s) do the next question.

Question L

(Look at Slide 5.) What unsafe barring practices are being used by these workers?
(Select as MANY as you think are correct.)

- 56. They are standing too close to the area being barred.
- 57. They are standing on floor rubble.
- 58. More than one person is on the bar.
- 59. They are working near an unguarded trolley wire.

When you have made your selection(s) do the next question.

Question M

Here is another situation where two miners are barring down bad top. (Look at Slide 6.) What unsafe barring practices are being used here? (Select as MANY as you think are correct.)

- 60. One miner is not wearing safety glasses.
- 61. One miner is not using the proper length bar.
- 62. The guard on the trolley wire isn't long enough to protect both miners.
- 63. One miner is barring roof that is directly over his buddy.

When you have made your selection(s) do the next question.

Question N

The safe practices that apply to roof scaling can also be used for taking down loose rib. (Look at Slide 7.) What safe scaling techniques is this miner practicing? (Select as MANY as you think are correct.)

- 64. He is wearing safety glasses.
- 65. He is wearing gloves.
- 66. He is using a straight scaling bar.
- 67. He is working under supported roof.
- 68. He is using good barring posture.
- 69. He is standing on solid bottom.

End of Problem

Scoring your performance

1. Count the total number of responses you colored in that were marked "correct". Write this number in the first blank on the answer sheet.
2. Count the total number of incorrect responses you colored in. Subtract this number from 24. Write the difference in the second blank on the answer sheet.
3. The best score is 69. The worst score is 0.